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Multiple Perspectives Framework to Model Complex Processes

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Abstract

The growing complexity of organisations has resulted in collaboration between multiple stakeholders becoming a challenging and critical issue that organisations must address in order to ensure their practices are sustainable. A multiple-case field study was conducted in order to demonstrate the proposed methodology of analysis and examination for knowledge-based systems in an actual organisational setting. The use of a multiple-perspective framework to improve understanding of the complex relationships in such systems was examined. In particular, the case study focused on the Australian Government's Nation Building Economic Stimulus Plan (NBESP) which provided \$1.9 billion to construct social housing across the State over two years. The results suggest that the use of a multi-perspective framework is appropriate and that there is a need for attention to be paid to the economic perspective.

Keywords

Complexity, Collaboration, Multiple perspectives.

INTRODUCTION

My involvement as a Quality Systems manager in the disciplinary area of business process management has enabled me to research and identify the experts in the field, and determine the criteria and effective methods for both the operations and control of processes. Furthermore, my role has included ensuring the availability of current and forthcoming information that is necessary to support an organisation. In exploring these areas I have become interested in organisational learning, understanding how current and future knowledge can be created and shared amongst multiple stakeholders.

This study outlines a conceptual framework based on the role of different organisational forms and suggests open models which could be used to better manage and understand the complexity of organisations. The majority of current modelling methods are suitable for structured systems. However, there is also a need to explicitly address new emerging structures in order to improve the collaboration process. This requires strong knowledge-sharing networks and an understanding of self-organisation in order to work constructively in search of innovative solutions to complex issues. Efficient self-organisation reinforces the importance of newly emerging structures that involve multiple levels of complexity (Merali, 2006) in organisations.

Modelling methods need to be introduced in such a way as to consider the need to analyse the management of change and to improve adaptation to it; this involves an examination of existing methodologies and organisational complexity. This section will consider how the introduction of innovative methods causes difficulties in organisations that are familiar with a pre-existing model. The subsequent emergence of self-organising social and economic networks introduces issues that are then linked with complexity (Merali, 2006). This study approaches these issues from both an empirical and theoretical viewpoint. The main aim in

conducting this study is to identify and develop a multiple-perspective framework to model complex processes across organisations.

COMPLEX ISSUES

Wicked Problem

Tackling ‘wicked problems’ often leads to social complexity (Head and Alford 2008). Also it causes social rather than technical complexities. Solutions to wicked problems usually involve coordinated action by a range of stakeholders, including organisations (Imperial 2004). In our case study, public housing issues cannot be dealt with at any one level of government but instead require action at every level of government as well as by non-profit community organisations. As Camillus (2008) mentioned that the description of wickedness is not predicated on degree of difficulty, wicked issues cannot be resolved through traditional processes, but rather organisations can learn to cope with them. Managing the wickedness of a strategy involves stakeholders and requires the documentation of opinions and communication.

Essential Design Criteria of Complexity Theory

The importance of complexity theory in offering the knowledge acquired in human social systems (McElroy 2000). The relationship between knowledge management, organisational learning and complexity theory in human organisations, when quickly adapting to changes; and has focused on second generation strategies for the creation of new knowledge for organisational demand (McElroy 2000). Moreover new characteristics in understanding complex organisations, Merali (2006) stressed the significance of adaptation and self-organisation in a dynamic environment. However, we proposing a model capable of capturing the emergent dynamics of complex systems are difficult and using traditional methodologies to analyse the complex issues involved is almost impossible. Thus, the essential criteria should be identified to factor in for model design.

Insufficient Integration of the Multiple Perspectives

For the purpose understanding complex processes and explaining social behaviours, the emergent domain creates complexity from the social behavioural perspective (Merali 2006) and it is important to adopt a multiple perspectives approach (Ferlie 2007; Imperial 2004; Imtiaz and Ikram 2008; Linstone 1985 and Merali 2006). However, without the integration of perspectives into a holistic model to manage system evolution, self-organising efforts to achieve sustainability are likely to prove difficult. Hence this study is significant to address the integration of multiple perspectives in model design.

RESEARCH QUESTION

To address the complex issues in organisations, facing contemporary organisations and their stakeholders, there is a necessity to settle upon a modelling method that can be used to analyse change management and to improve adaptation. This can be achieved by examining existing methodologies and organisational complexities; developing an innovative method that compares with the benefits of existing models is challenging.

Four multiple case studies were conducted on complex projects in three anonymous Australian government agencies. The use of a case study to evaluate the effectiveness of the proposed framework allows system evolution to be more easily managed and facilitates the support of multiple stakeholders in the coordination of complex projects.

Thus three research questions were investigated through the use of case study:

- Does a new multiple perspective framework improve the ability to manage change in complex
- How can changes in circumstances affect knowledge flow in organisations?
- How does the organisation respond to the unforeseen circumstances required for better knowledge flow?

The study aims to identify and develop a model that impact on the multi stakeholder collaboration to manage complex problem and expertise with organisations.

SIGNIFICANCE

This study will offer a substantial contribution to both social behavioural perspective research and the modelling of multiple perspectives techniques. There is a significant finding to prove the effectiveness of the emergent

structure for improving organisational collaboration. The results from this study will make several contributions to the current literature.

- Firstly, providing further analysis of methods in relation to integrating complexity theory (McElroy 2000);
- Secondly, addressing new characteristics of the organisation, noted by Merali (2006) and;
- Thirdly, a multiple perspective framework will improve collaborative architecture in a complex environment.

The researcher has examined the strategy for improving complex processes which is significant for developing the model and states self-organisation through the internal diversity practice as being crucial for the organisation in order to accustom to a changed environment. In contrast, the multiple perspectives model attempts to combine self-organisation with different dimensions of the organisation's architecture for easy management when significant changes occur. For example, an organisation tackles complex problems by examining the business processes and strategic goals rather than making an effort to change a behavioural relationship between the roles and activities that take place in the environment. The paper also describes the beneficial nature of the multiple perspectives framework with regards to the complex organisation.

LITERATURE REVIEW

The literature on collaborative innovation suggests several approaches to deal with different design models to support new process implementation in self-organised business processes. Placing value on collaborative innovation, dimensions of new multi perspective performance are explored and examined so that new ways of modelling will be able to assist in resolving the issues posed by new organisational process implementation, enabling a swift responsiveness to change. A number of studies (Cohen, 1999; McElroy, 2000; Dagnino, 2004 and Smith and Humphries, 2004) have highlighted the importance of complexity theory and have concluded that it is difficult to translate into practice. A model-combining holistic model could be developed using a number of perspectives to model the complex system. This approach focuses on describing the behavioural perspective of social system dynamics and organisational structures.

However, the implications of adopting the new perspective models in the management of system evolution have only been partially addressed. Researchers in IS have emphasised the significance of self-organisation (Arthur *et al.*, 2001; Andriani, 2005 and Heylighen, 2008). Conversely the development of a model to capture the emergent dynamics of complex systems is difficult and would prove almost impossible to use traditional methodologies to analyse complex issues. In practice, adaptive strategies are required to sense change in the environment and to assess the significance of diversity and self-organisation.

Although theoretical and empirical understanding of self-organisation is key, the significance within and across organisations remains limited. Thus, further studies are needed to improve the behavioural perspective of dynamic social systems. Complex processes are to be extended to support the elements of the organisation and for further adoption of system evolution.

The following section will propose a multi-perspective framework to fill the gap identified.

MULTIPLE PERSPECTIVES FRAMEWORK

The proposed framework is a holistic model consisting of organisational, business, knowledge and social perspectives. These were chosen to describe the evolving environment and self-organisation is needed to manage the complex processes within the environment. The subsequent section describes the use of this approach for modelling the different dimensions of organisational architecture for collaboration.

Theoretical Evaluation of the Model

As illustrated in Figure 1, the multi-perspective framework has the overall task of managing the processes of organisation and the development of new knowledge through integration and adaptation to changes. It is also capable of identifying requirements and social complexities (Hawryszkiewicz 2010). This study extends these perspectives on collaborative architecture by identifying new characteristics for the effective system design of the common framework. Integrating the multiple-perspective views is necessary to understand organisational complexity and to improve knowledge flows in the complex environment. A model that enables a new approach to analysing, defining and managing the interdependencies across agencies engaged in a partnership alliance is proposed. Figure 1 illustrates the common framework in which the multiple perspectives approach helps to understand organisational complexity.

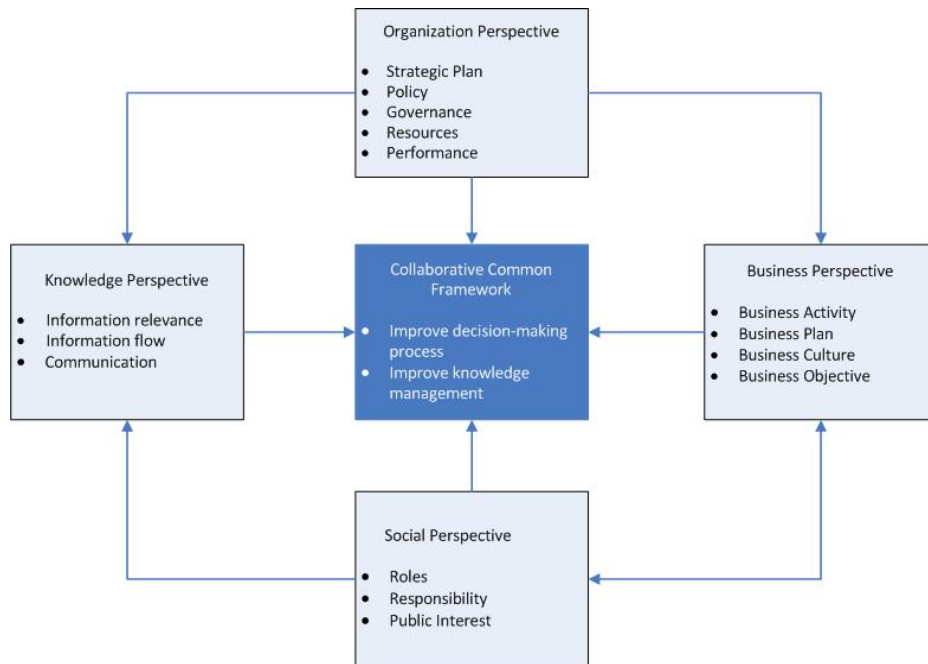


Figure 1: Integration of different dimensions for collaborative architecture

From an organisational perspective, policy can be referred to organisational rules and the actual practices of government (Colebatch 2002). Successful organisations need to understand how each functional unit interacts and how the policy derives from expert groups. In particular, recognition of unique cultures is important for a change from an organisational perspective. For example, organisational perspective approach helps to understand the way things are currently and easily identify the culture change aligned with strategic direction. Moreover, this method provides an organisational learning process and being used for enterprise relationships. It also recognizes the interaction between organisational units and their activity and responsibility.

Relating to a business perspective, activities can be categorized as services that are required to build successful organisations. The objective of this method is to enable activity groups to understand how they achieve and deliver the key business goals. For example, business perspective method enables change for business benefit and assists the stakeholders' interactions. Moreover, it generates knowledge to build better relationships between the government agencies.

Looking at a knowledge perspective point of view, second generation knowledge management (McElroy 1999) can be defined as organisational practices that create the knowledge processes to produce organisational learning. For example, this method supports unstructured communities and enables to share knowledge between the communities including groups such as control, expert, policy and governance. It also facilitates collaboration and innovation to support emergence. The knowledge perspective uses rich pictures from soft system methodologies to describe the knowledge sharing and learning that takes place within collaborative environments.

Pralahad and Krishnan (2008) emphasize the importance of social networks that encourage innovative behaviour. Addressing it from a social perspective, roles can be identified as imperative dynamic to adapt changes in organisational structures. For example, this method displays the way people interact and knowledge created. Furthermore, it demonstrates how initial knowledge infrastructure is being created and adapt to evolving systems. A model of the social perspective draws on techniques used in social networking but extends them into an organisational framework by focusing on roles, their responsibilities and relationships between these roles. An enterprise social network may support different types of responsibility such as coordinate decision making. It requires the roles to use and create enterprise knowledge to continuously improve the performance of organisational processes which manages the interactions among the members. Enterprise social network modelling efforts can be categorized as their emphasis based models of roles, complexity of activities (Schulz 2005) and organisation.

RESEARCH DESIGN

This study has used a multi-perspective model based on relevant literature. The model was then reconstructed based on a collaborative design through a pilot case study, prior to employing the multiple case study research method to further refine the model. The case study method is the most common qualitative method used in information systems (Orlikowski and Baroudi, 1991 and Alavi and Carlson, 1992). It is an empirical form of

enquiry that investigates an emerging area in which multiple sources of evidence are used (Yin, 2002). The model was validated through a multiple case study involving four case studies across three Australian government agencies. The resulting conceptual model can be easily evaluated as an instrument of analysis designed to capture and record evidence for further validation of the successful model. The following section outlines the approach used in the research design that validates the model through the multiple case studies.

Case Study Design

A pilot case study and four subsequent multiple case studies were carried out using the modelling success dimensions described above. A qualitative method was employed to examine the organisations in order to understand the complex processes and collaboration issues encountered. The use of a case study to evaluate the effectiveness of the proposed framework allows system evolution to be more easily managed and facilitates the support of multiple stakeholders in the coordination of complex projects. Through the use of the method described above, the initial research was able to retrieve innovative designs to improve the model whilst also validating the framework. In the initial findings, a pilot case study enabled identification of the most important factors for success to incorporate into the model dimensions. In recognition of various known case study methods, the participants were asked questions about complex project coordination across organisations. Semi-structured interviews were used to obtain primary data on working practices within dynamic organisations. Documentation of all procedures relates to the interview findings and the analysis of data for the validation phases of the research project. All the interviews were instigated in two phases in which pre and post-experimental questionnaires were used to collect information regarding the case study. Furthermore, the researcher employed content analysis to review the literature and to critically evaluate the multi-perspective approach.

The use of multiple sources of evidence allowed the validity of the concept to be reinforced in the pilot case study. More results were obtained by conducting four multiple case studies. The case studies involved eight months of qualitative data gathering and a close relationship was maintained with the participants, including directors, project managers and professional managers involved in change management and social networking in their complex projects. A total of 58 questionnaires, consisting of closed and open ended questions were distributed and 35 responses were received. Responses were analysed qualitatively by identifying the common themes of problems and comparing similarities and differences. This enabled me to gain greater insights into the knowledge required to develop a multi-perspective framework.

Clustering and Thematising

The themes that I constructed are a result of my interpretations of the narratives of the various project managers and professionals. An exploration into these themes assist to provide awareness on the experiences of professionals in managing complex projects and have been influenced by previous organisational studies on complexity such as the work by Maguire (2006), Mason (2007) and Merali (2006). Consequently they help in how another view of complexity may provide the knowledge required for organisational architecture, insights into the impacts on social networking communities, the shaping of their identities and motivates their knowledge sharing behaviours.

I clustered the invariant constituents and established the participants' experience as core themes (Moustakas, 1994). The invariant constituents of the participants' experience were synthesised to construct thematic labels. The recording and grouping code report was used to generate the six themes crucial in responding to the main research question: (1) methods used to manage complex problem; (2) methods used to collaborate with stakeholders; (3) process of decision making; (4) accessibility of knowledge; (5) attributes of performance measure; and (6) change adaptation practices.

The participants' involvement in this project encouraged the emergence of meaningful results and provided knowledge required to understand organisational complexity.

RESULTS

Conducting the research and testing the validity of the model in close cooperation with participants in government agencies enables wicked problems faced by organisations to be managed effectively. This project emphasises the use of the newly gathered data to evaluate the development of a multi-perspective model and all areas concerned with the study of complexity, in which organisations have to face emerging changes.

Participants' Attribute Value

To conclude each interview, participants in this study were asked to evaluate the ideas that they had conveyed as well as the importance of the multi perspective model to provide a common platform for multiple stakeholders'

collaboration in order of rank. Then I collected a ranked list of each perspective of the framework that participants agreed to which was required for all complex projects.

Fifteen out of 35 (42.86%) participants responded that it was critical and 12 (34.29%) participants agreed it was very important. A further 7 (20%) participants stated that it was important, whilst one (2.86%) participant replied otherwise. The invariant constituents central to the theme are as follows: (a) common framework (10 out of 35 participants, 29%), (b) approval workflow (6 out of 35 responses, 17%) and (c) effectiveness of decision process (6 out of 35 participants, 17%).

The most significant and highly relevant themes emerging from the aggregation of the invariant constitutes illustrates that common framework requires to collaborate with multiple stakeholders. After carrying out this study, it was found that the themes were supported therefore the multiple perspective model helps in understanding complexity.

The organisational perspective anticipates an environmental uncertainty which includes complexity and sustainability. Dooley (2002, p3) states that organisational complexity as the amount of differentiation that exists within different elements constituting the organisation. With regard to organisations, Anderson (1999, p. 216) describes complexity as a structural variable that characterizes both organisations and their environments. Participants in this study were asked about the importance of the organisational perspective in controlling changes in the unlikely event of unforeseen circumstances. Fourteen out of 35 (40%) participants strongly agreed and 17 (48.57%) participants agreed that it was important for the business. A further 2 (5.71%) participants were not sure, whilst two participants disagreed. The invariant constituents central to the theme are as follows: (a) organizational objectives (11 out of 35 participants, 31%), (b) resources/improvement (6 out of 35 responses, 17%) and (c) performance (5 out of 35 participants, 14%).

The most significant and highly relevant themes emerging from the aggregation of the invariant constitutes illustrates that within organizational objectives to respond quickly to unforeseen circumstances.

The business perspective of cooperative activities describes the objectives in a business plan required for a group to share goals. Business activities, which include task identification and investigation, provide an insight into the organisational context of the business culture. Shipp *et al.* (2008) argue that activities lead to learning and discovery, which in turn inspires innovation and knowledge to enable problem-solving. Participants were asked how the business perspective is an important factor in responding to unforeseen circumstances in a rapidly changing environment. Ten out of 35 (28.57%) participants strongly agreed and 20 (57.14%) participants agreed that it was important for the business. A total of 30 out of 35 (85.71%) participants agreed that knowledge flows in all business activities are important and agreed, with the remainder giving neutral responses. The invariant constituents central to the theme are as follows: (a) business activity/plan (17 out of 35 participants, 49%), (b) business culture (11 out of 35 responses, 31%) and (c) not sure (3 out of 35 participants, 9%).

The most significant and highly relevant themes emerging from the aggregation of the invariant constitutes illustrates that user facilitate the changes within business activity and plan to adapt quickly to unforeseen circumstances.

The knowledge perspective controls the flow of information and access to the right information for sharing and reuse. It is difficult to identify the experts involved, the community of practice and communication with multiple stakeholders among business units and other agencies. Wenger (1998) refers to communities as the containers of competences, and explains how learning occurs on different levels. Wenger further states that interactions between communities' members play an important role in social learning systems. The case study showed that fourteen out of 35 (40%) participants strongly agreed, 20 (57.14%) participants agreed and one participant had no opinion that the knowledge perspective plays an important role in delivering effective information flow for better decision making. The invariant constituents central to the theme are as follows: (a) information flow (17 out of 35 participants, 49%), (b) effectiveness of decision process (7 out of 35 responses, 20%) and (c) information relevance (4 out of 35 participants, 11%).

The most significant and highly relevant themes emerging from the aggregation of the invariant constitutes illustrates that users will know what to do in the unlikely event of unforeseen circumstances in the analysis of information flow.

The social perspective focuses on the roles and responsibilities that change in the diverse culture and social interactions between business units and among all stakeholders. In particular, it is difficult to identify integration through roles and adaptation to changes. This study particularly focused on a social complexity that possesses the role of the functional units and multiple stakeholders. With regard to the complex issues and significant changes that have arisen in recent years, social complexity can be fragmentary in nature, leading to difficulty in effective communication (Conklin, 2005). Social complexity therefore needs tools that are standardised for complex organisations. This notion of social complexity correlates to a project group involved in a social network. Participants were asked about the importance of the social perspective in unforeseen circumstances. The results

show that over two-thirds (82.86%) of responses described it as very important and agreed with the statement, whilst 6 (17.14%) participants responded otherwise. The invariant constituents central to the theme are as follows: (a) relationship/exchange experience (22 out of 35 participants, 63%), (b) not sure (6 out of 35 responses, 17%) and (c) responsibility (4 out of 35 participants, 11%).

The most significant and highly relevant themes emerging from the aggregation of the invariant constitutes illustrates that build better relationship and exchange experience to identify experts and information in the unforeseen circumstances.

Case studies are typically methodologies which provide opportunities for an intensive analysis of complex phenomena (Miles, 1979) and more specifically, assisting with the development of theories based on the synthesis of evidence extracted from the case studies. The multiple case study approach provided me with an understanding of a complex issue and identification of new characteristics for a dynamic environment. The primary data were collected and stored for continuous analysis of an influence of multi-perspective views on the significance of diversity and self-organisation. The combination of five constructs from managing within complex environment research provided overall insights summarised in Table 1.

Table 1. Insights from multiple case studies

Constructs guided the investigation	Research question	Result
Multi perspective model <ul style="list-style-type: none"> Satisfaction 	Does a multiple perspectives framework improve the ability to manage change in complex organisation? (RQ1)	After carrying out this study, it was found that the themes were supported therefore the multiple perspective model helps to manage change. Relates to Theme 5: Attributes of performance measure & Theme 1: Methods used to manage complex problem
Organisation perspective <ul style="list-style-type: none"> Policy impact Model quality 	How does the organisation respond to unforeseen circumstances needed for better knowledge flow? (RQ3)	Organisation perspective had an impact and was crucial to enhancing the quality of decision-making. Relates to Theme 3: Process of decision making.
Business perspective <ul style="list-style-type: none"> Model content Process development impact 	How can changes in circumstances affect knowledge flow in organisations? (RQ2)	Business perspective had an impact and was important of the model. Relates to Theme 6: Change adaptation practices.
Knowledge perspective <ul style="list-style-type: none"> Model use Information flow 	Is the model based on a multi perspective approach that will help to identify knowledge flow for unforeseen circumstances? (RQ1a)	Knowledge perspective had an impact and was very important of the model. Relates to Theme 4: Accessibility of knowledge.
Social perspective <ul style="list-style-type: none"> Collaboration impact 	Does the model help organisation to learn how to discover knowledge? (RQ1b)	Social perspective had an impact and was important of the model. Relates to Theme 2: Methods used to collaborate with stakeholders.

The study confirms that multi-perspective model verification and efforts to improve the collaborative process require innovative solutions to complex issues. Moreover, this study offers the experiences and perspectives of the users to develop a collaborative common framework in order to have an understanding of the effectiveness of their complex projects. This information may enable them to simplify decision processes to coordinate their projects and better meet the needs of partnership alliance for sustainable communities.

DISCUSSION

The research was conducted using multiple case studies to an understanding of a complex issue and identified new characteristics for a dynamic environment. By conducting the case studies and testing the validity of the model in close cooperation with participants in the government agencies, there is effective management of wicked problems faced by organisations. This project places emphasis on bringing the newly gathered data to evaluate the development of a multi perspective model and all areas concerned with the study of complexity, where organisations have to face emergent changes. The next phase of the study will analyse the results gathered from primary data, both newly collected and archived materials to expand and examine the success modelling dimensions for validity and reliability. Skyrme (2003) argues that all governments are reluctant to respond promptly to unforeseen circumstances and to provide the higher quality services that are expected by its citizens. In contrast, knowledge management has played an important role in ensuring organisational performance improvement in the private sector. Moreover, research is also needed to investigate the behavioural perspective of social system dynamic with complex processes which are to be extended to the support elements of the organisation and for further adoption of system evolution.

Multi perspective model verification with efforts to improve the collaborative process requires innovative solutions to complex issues. However, their effectiveness can be limited without some additional tools to improve collaboration between the different dimensions of perspectives from the theoretical to the practical. As a consequence, the result of model verification process is changeable. A model examined through case study of public sector in Australia. Future research should therefore concentrate on the investigation of dynamic complexity which can be evaluated to support higher levels of adaptability to manage system evolution for private sector and other countries.

CONCLUSION

This study aimed to determine the effect of the multi-perspective framework. The objective was to develop a methodology to support systems in complex environments. This study outlines the management of self-organisation and the analysis of knowledge flows, which pose a serious challenge to the public sector. The proposed framework characterises the unstructured knowledge flow for effective management of collaborative interactions between stakeholders. The model enables organisations to respond to a rapidly changing environment. Moreover, it helps to manage system evolution and will have a significant impact in the public sector. These outcomes are likely to make a substantial contribution to both research on the social behavioural perspective and the modelling of multiple-perspective techniques. Significant findings on the effectiveness of the emergent structure for improving organisational collaboration were made. The empirical findings in this study present a new understanding of the model's ability to manage system evolution and to provide a practical approach for integrating multi-perspective views.

Further experimental work is needed to determine the extent to which the external validity of the multiple perspectives framework is beneficial to the complex organisation. The economic perspective also merits further attention.

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